

*JMS***Environmental Resources Management, inc.**

855 Springdale Drive • Exton, Pennsylvania 19341 • (215) 524-3500 • Telex 4900009249

13 January 1989

Ms. Janet Feldstein
U.S. Environmental Protection Agency
Region II
Emergency and Remedial Response Division
Room 737
26 Federal Plaza
New York, NY 10278

File No: 802-01-00-01

Dear Janet:

Enclosed for your review is the Interim Status Report on Task 1 of Phase I of the Feasibility Study/First Operable Unit for the SCP/Carlstadt Site.

If you have any questions/comments, please contact me at (215) 524-3521. Thank you.

Sincerely,

Marian E. Donovan Carlin

Marian E. Donovan Carlin
Project Manager

MEDC/sw

Enclosure

cc: Pam Lange
Gil Weil
Harry Yeh
Ron Fender

01/19/89

INTERIM STATUS REPORT ON TASK 1 OF PHASE I
FEASIBILITY STUDY FOR FIRST OPERABLE UNIT
SCIENTIFIC CHEMICAL PROCESSING SITE
CARLSTADT, NEW JERSEY

13 January 1989

Prepared For:

SCP/Carlstadt PRP Committee

Prepared By:

Environmental Resources Management, Inc.
855 Springdale Drive
Exton, PA 19341

FILE: 802-01-00-01

001978

DRAFT



SECTION I

INTRODUCTION

1.0 Purpose and Scope of Interim Status Report

This Interim Status Report summarizes the first portion of the evaluation and screening of remedial technologies which is Task 1 of Phase I of the Feasibility Study for the First Operable Unit (FS/FOU) for the Scientific Chemical Processing (SCP) site. This Interim Status Report provides the highlights of the Task 1, Phase I activities completed to-date.

The format of the FS/FOU follows the guidelines as stated in the EPA September 1988 Interim Final Report "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", which reflects new emphasis and provisions of SARA.

Background information presented below on site use, waste characteristics, and hydrogeologic conditions is derived from previous site work by Dames and Moore or its subcontractors unless otherwise noted.

1.1 Brief Background of Formal Site Operations

The Scientific Chemical Processing (SCP) site is located at 216 Paterson Plank Road in Carlstadt Township, Bergen County, New Jersey, at latitude 40° 49' 30" N, longitude 74° 04' 38" W. The site is a corner property, bounded by Paterson Plank Road on the south, Gotham Parkway on the west, Peach Island Creek on the north, and an industrial facility on the east (Figure 1).

The land on which the SCP site is located was purchased in 1941 by Patrick Marrone, who eventually sold it to a predecessor of Inmar Associates, Inc. The date of this transaction is not available. While Marrone owned the site, it was reportedly used for solvent refining and solvent recovery. One reported operator included Scientific Chemical Treatment Company. Aerial photographs indicate storage of drummed materials on the site; a 1962 air photograph most clearly indicates this. On October 31, 1970, the Scientific Chemical Processing Company, Inc. leased the Carlstadt site from Inmar Associated (Reference 1). On September 20, 1977, Inmar Associates purchased the adjoining lots from Patrick Marrone and added them to the land SCP had been leasing (Reference 2). SCP used the site for recycling industrial constituents from 1971 until it was shut down by a court order in October, 1980 (Reference 1).

**CARLSTADT, NEW JERSEY
SITE MAP**

STABLES (RACETRACK)

PATERSON PLANK ROAD

GATE

BUILDINGS

TANKS & DRUM STORAGE AREA (?)

TRAILER

TRAILERS

SHED

CONCRETE PAD

FORMER SLUDGE PIT AREA (INTERPRETED)

DRUM STORAGE AREA (CONCRETE PAD)

TRUCK TERMINAL

FENCE

GUTHAN PARADISE

INDUSTRIAL BUILDING

BOILER HOUSE

TANKS

TRAILER

TANK

PLATFORM

TWIN-FILM EVAPORATOR AREA

TRAILERS

SHED

TANKS

DIKE

PEACH ISLAND CREEK

BANK

STILL

0 100 200
APPROXIMATE SCALE IN FEET

The
ERM
Group

While in operation, SCP received liquid by-product streams from chemical and other industrial manufacturing firms, then processed the materials to reclaim marketable products, such as methanol, which were sold to the originating companies. In addition, other liquid hydrocarbons were processed to some extent, then blended with fuel oil, and the mixtures were typically sold back to the originating companies, or to the cement and aggregate kilns, as boiler fuel.

In addition to the constituents and recyclables noted above, the site also received other items, including paint sludges and acids.

Operations at the site ceased in 1980. At that time, over 300,000 gallons of waste and recyclable materials were stored on the site. These have since been removed. They were primarily in liquid form and included (Reference 3):

- Number 2 fuel oil
- Fuel, fuel residue and water mixture
- Methanol/phosphoric acid solutions
- Etching solutions
- Solvents and thinners

1.2 Nature and Extent of Problem

Site stratigraphy consists of earthen fill material underlain by a naturally-occurring clay, underlain by glacial till which overlies bedrock comprised of shale.

There are three aquifer systems present in the site vicinity. In order of depth from grade they are: the water table aquifer, till aquifer, and bedrock aquifer.

Two water-bearing units were investigated during the RI: the fill material and the glacial till. The fill (or water table) aquifer occurs at a depth of two feet below grade. The till aquifer may be confined beneath the clay layer.

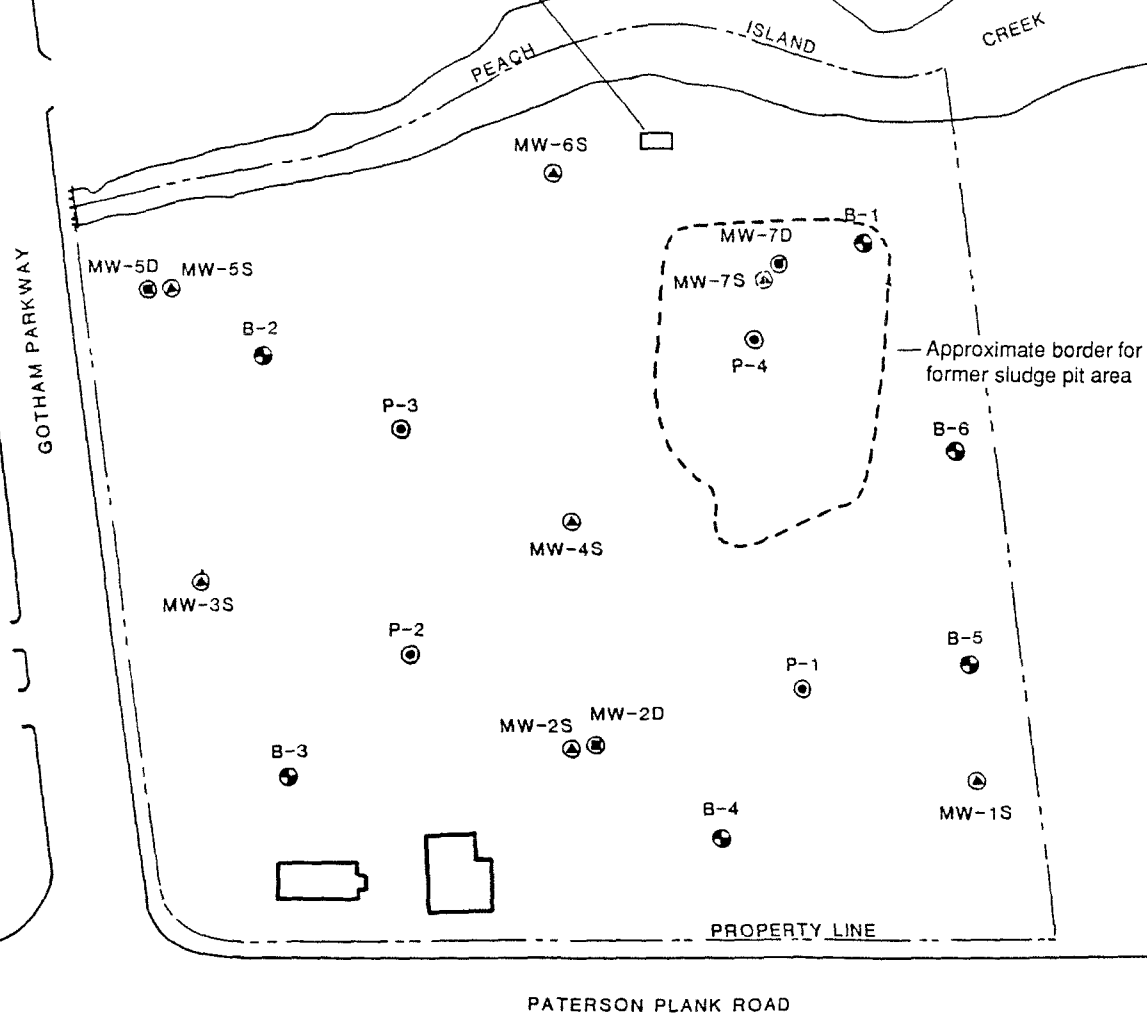
The FS is designed to identify and evaluate source control alternatives for the remediation of the first operable unit which consists of: on-site sludges, surficial soils above the clay, and shallow ground water. In the following paragraphs, the contaminants found in the aforementioned media are described.

On-Site Sludges

An earthen sludge pit surrounded by a soil berm exists in the northeastern corner of the site (Figure 2). The sludge extends from just below grade (a thin crust of soil overlies the sludge) to a depth of approximately 11 feet below grade, although the bottom may be peat. As reported in the Dames and Moore

2 ft below

Figure 2
Approximate Location of Sluge Pit
 SCP Site
 Carlstadt, New Jersey



Source: Danes & Moore - SCP
 Remedial Investigation
 Report, September 1988

"Alternatives Arrays Document Draft Report", May 24, 1988, the sludge pit has an area of approximately 5,000 cubic yards of sludge/soil mixture. Table 1 presents sample analyses of the sludge.

gals?
In addition to the sludge pit, a 5,000-gallon tank containing approximately 10 cubic feet of sludge will require remediation. The approximate location of this tank is shown in Figure 2. Sample analysis of the tank sludge is presented in Table 2.

Surface Soils (Fill)

There are no natural surface soils at the site. Instead, the site is covered with construction debris and earthen fill material that was brought in from off site. These materials have a wide range of composition and particle size. Concrete, shingles, wood, brick, crushed stone, red shale blocks, sand and gravel were some of the materials that were identified in the fill, in sizes ranging from less than 1 inch to over 6 inches. The thickness of the fill ranges from 3 to 11 feet, with an average thickness of approximately 8.4 feet.

For the unsaturated portion of fill, there are inconsistencies in the presentation of data between the Dames and Moore RI Report (September 19, 1988) and the Terra, Inc. "Public Health Assessment of the Scientific Chemical Processing (SCP) Site, June 28, 1988" report. The data presented in the Terra report is preferred for FS evaluation since it provides details on compound-specific concentrations. Table 3 presents the summary of the constituent concentrations reported by Terra, Inc. for the unsaturated fill.

D+M has specific data!!
TERRA has D+M's data
||??

The Dames and Moore RI Report states that the constituent concentrations for the saturated portion of the fill are as follows (Terra, Inc. did not report data for saturated fill): within the saturated portion of the fill, total volatile organic concentrations ranged from non-detected to 9,890 mg/kg, with a mean concentration of 2,069 mg/kg. Total base/neutral concentrations ranged from non-detected to 3,913 mg/kg, with a mean concentration of 343 mg/kg. Total acid extractable concentrations ranged from non-detected to 801 mg/kg, with a mean concentration of 169 mg/kg. Total PCBs ranged from non-detected to 350 mg/kg, with a mean concentration of 62 mg/kg. Total cyanides ranged from non-detected to 32 mg/kg, with a mean concentration of 8.5 mg/kg. Total phenolics ranged from non-detected to 683 mg/kg, with a mean concentration of 66 mg/kg. Total petroleum hydrocarbons ranged from 36 mg/kg to 29,600 mg/kg, with a mean concentration of 8,507 mg/kg. Three pesticides and twelve metals were also detected.

Underlying portions of fill are peat. This soil is made up of decayed plant material of variable composition depending (in part)

TABLE 1
SAMPLE ANALYSES FOR SLUDGE PIT
SCP/CARLSTADT SITE

Constituent	Concentration, mg/kg*		
	Depth of Sample		
	0 - 2 feet	5 - 6 feet	Top of Clay
VOCs (Priority Pollutant Volatiles)	4,055.70	5,464.10	621.44
Acid Extractables	19.77	279.40	7.66
Base Neutrals	169.60	114.74	62.3
Petroleum Hydrocarbons	28,049.70	12,270	472.33
Total Phenols	2.77	248.50	23.23
Total Cyanides	2.53	9.13	<1.63
Pesticides	.20	50.31	0.07
PCB 1242	5,000.11	77.86	2.49
PCB 1254	4	--	--
PCB 1248	4	--	--
Metals:			
Antimony	5.33	2.53	--
Arsenic	5.13	21.10	5.83
Beryllium	8.26	0.39	0.52
Cadmium	33.87	11.23	44.54
Chromium	273	211	25
Copper	5,485	3,074	4,019
Lead	1,339.30	940	78.67
Mercury	2.03	1.49	0.24
Nickel	24.33	34.30	13.97
Selenium	0.63	--	0.43
Silver	6.33	13.33	0.40
Zinc	17.44	734.67	101.67

Note: *Concentrations based on averaging soil analysis from B-1, P-4 and MW-7D

001984

TABLE 2

TANK SLUDGE SAMPLE ANALYSIS
SCP/CARLSTADT SITE

Constituent	Concentration
Specific Gravity	1.37
Total Solids	64.76%
Water Content	4%
Flash Point	212°F
Ash Content	23.62%
Heating Value	6,940 BTU/lb
Aluminum, as Al	29.30 mg/L
Arsenic, as As	7.07 mg/L
Barium, as Ba	2620 mg/L
Cadmium, as Cd	12,300 mg/L
Copper, as Cu	28.30 mg/L
Lead, as Pb	5,000 mg/L
Mercury, as Hg	1,560 mg/L
Nickel, as Ni	32.30 mg/L
Selenium, as Se	0.02 mg/L
Silver, as Ag	2.90 mg/L
Zinc, as Zn	1,410 mg/L
Potassium, as K	291 mg/L
Total Sulfur	4,930 mg/L
Total Chlorides, as Cl	109,000 mg/L
Total Fluorides, as F	879 mg/L
Total Cyanides, as CN	<10 mg/L
Oil and Grease	23.60%
PCB, Aroclor 1242	32,300 mg/L

Note: Concentration based on one sample analyzed by
Chemical Waste Management on 5 September 1986.

TABLE 3

SURFACE SOIL SAMPLING DATA*
SCP/CARLSTADT, NEW JERSEY

<u>Compound</u>	<u>Maximum Concentration mg/kg</u>	<u>Average Concentration mg/kg</u>	<u>Number of Occurrences</u>
Volatile Organics			
tetrachloroethylene	4290	422	16
benzene	539	181	3
chloroform	47.3	12	5
trichloroethylene	2060	153	14
1,2-dichloroethane	23.2	6.34	4
1,1,2,2-tetrachloroethane	0.787	0.538	2
1,1-dichloroethylene	0.080	0.080	1
1,1,2-trichloroethane	0.113	0.113	1
chlorobenzene	336	86.2	4
toluene	3380	444	9
ethylbenzene	652	99.8	8
1,1-dichloroethane	64.7	37.9	2
1,2-dichlorobenzene	47.3	14.0	9
1,2,4-trichlorobenzene	1.69	0.975	3
1,4-dichlorobenzene	1.83	1.31	2
1,3-dichlorobenzene	0.962	0.68	2
trans-1,2-dichloroethene	0.073	0.032	3
1,1,1-trichloroethane	2.49	1.04	3
methylene chloride	2.39	0.510	13
xylenes	1725	270	8
Subtotal	13200.0	1730.0	
Semi-Volatile Organics			
fluorene	11.0	2.54	9
indeno[1,2,3-c,d]pyrene	12.1	4.51	6
naphthalene	102	8.72	18
n-nitrosodiphenylamine	2.48	1.50	4
nitrobenzene	117	84.7	2
phenanthrene	23.6	6.58	13
pyrene	12.7	3.22	17
dibenzo[a,h]anthracene	2.40	1.45	2
benzo[a]pyrene	9.39	2.64	11
benzo[a]anthracene	4.54	2.08	6
bis(2-ethylhexyl)phthalate	281	73.4	19
phenol	58.2	16.4	4
di-n-butylphthalate	71.0	11.2	15
2,4 dichlorophenol	5.06	5.06	1
diethylphthalate	5.09	4.99	2
2,4 dimethylphenol	1.12	0.633	2
2-chloronaphthalene	122	61.1	2
acenaphthene	3.78	1.32	9
acenaphthalene	0.546	0.546	1

001988

TABLE 3 (con't.)

<u>Compound</u>	<u>Maximum Concentration mg/kg</u>	<u>Average Concentration mg/kg</u>	<u>Number of Occurrences</u>
Semi-Volatile Organics (con't)			
anthracene	3.91	1.27	9
benzo[b]fluoranthene	17.7	7.002	6
benzo[k]fluoranthene	3.79	3.79	1
benzo[g,h,i]perylene	6.95	2.79	7
butylbenzylphthalate	86.1	14.5	10
chrysene	5.50	2.05	12
di-n-octylphthalate	9.05	4.46	7
fluoranthene	15.3	3.303	18
Subtotal	993.0	332.0	
Metals			
arsenic	60.0	14.0	14
copper	71600	7909	19
lead	2750	648	19
selenium	4.90	2.30	5
silver	19.0	6.36	5
nickel	40.0	21.8	17
cadmium	95.1	14.6	19
zinc	4170	584	19
mercury	21.3	3.04	4
antimony	16.0	10.5	4
beryllium	57.6	4.53	17
chromium	721	118.5	19
Subtotal	79600.0	9340.0	
PCBs			
PCB 1242	15000	1421	11
PCB 1260	48.0	28.9	2
PCB 1248	23.0	13.6	5
PCB 1254	12.0	7.86	5
Subtotal	15100.0	1470.0	
Pesticides			
Dieldrin	57	16.3	5
Aldrin	57	19.1	3
Subtotal	114.0	35.4	
TOTAL	109000.0	12900.0	

* Approximately 0 - 2 feet below grade

Note: Concentrations presented in this table were obtained from the Terra, Inc "Public Health Assessment of the Scientific Chemical Processing (SCP) Site, June 28, 1988" Report.

001987

on types of the parent vegetable matter. This semi-continuous layer of peat has a very high water content and varies in thickness from 0 to 7 feet, with an average thickness of approximately 1.8 feet. Beneath the fill and peat is a clay unit 3 to 38 feet thick. The clay unit is underlain by glacial till which overlies bedrock.

Shallow Ground Water (Water Table Aquifer)

The water-bearing unit for the water table aquifer is the man-made fill and the underlying peat. The ground water table is very shallow, usually within 1 to 2 feet below ground water surface and occurs under perched conditions above the underlying clay. Ground water elevations were measured and recorded at different times. The ground water in the water table aquifer has been reported by Dames and Moore (RI Report, September 19, 1988) to flow radially, either away from or toward the site.

The ground water flow patterns in the water table aquifer can be explained in the context of the site's subsurface conditions. The water table aquifer contains large quantities of man-made fill which is extremely variable in composition. As a result, the transmissivity varies throughout the site. Slug test data from the on-site shallow wells indicate two orders of magnitude of variation in permeability values (1×10^{-3} to 1×10^{-4} cm/sec) across the site within the fill materials.

The water table aquifer responds very rapidly to precipitation events. This would be expected given that the water table surface occurs approximately 2 feet below grade and the overlying surface material is very permeable. Based on the straight-line form of the hydrographs present in the Dames and Moore "Remedial Investigation RI Report" September 19, 1988, it appears that the tidal effect occurring in the Peach Island Creek does not influence water levels in the water table aquifer. This may be due to a bank storage effect, the small water column of Peach Island Creek, and the fact that the water table is significantly higher (approximately 5 feet) than the water surface on the creek.

For the water table aquifer, there are inconsistencies in the presentation of data between the Dames and Moore RI Report (September 19, 1988) and the Terra, Inc. "Public Health Assessment of the Scientific Chemical Processing (SCP) Site, June 28, 1988" report. The data presented in the Terra report is preferred for FS evaluation since it provides details on compound-specific concentrations. Table 4 presents the summary of the constituent concentrations reported in the Terra, Inc. report for the water table aquifer.

TABLE 4
WATER TABLE AQUIFER SAMPLING DATA
SCP/CARLSTADT, NEW JERSEY

<u>Compound</u>	<u>Average Concentration mg/l</u>	<u>Maximum Concentration mg/l</u>	<u>Number of Occurrences</u>
Volatile Organics			
chloroform	304	614	4
1,2 dichloroethane	221	473	4
trichloroethylene	72.2	161	8
1,1,2,2-tetrachloroethane	4.40	7.35	4
tetrachloroethylene	16.9	24.5	3
1,1-dichloroethylene	0.400	0.400	1
benzene	3.44	6.83	10
vinyl chloride	3.86	7.29	9
2-butanone (MEK)	648	2000	5
trans-1,2-dichloroethylene	17.1	64.7	12
chlorobenzene	3.57	6.56	3
toluene	26.8	90.9	14
1,1-dichloroethane	3.08	11.7	8
methylene chloride	55.9	200	10
1,2-dichlorobenzene	0.085	0.192	6
1,1,1-trichloroethane	39.4	81.2	5
ethylbenzene	2.02	3.90	6
chloroethane	2.42	2.42	1
xylene	7.80	17.8	14
Subtotal	1430.0	3770.0	
Semi-volatile Organics			
bis(2-chloroethyl)ether	1.32	1.39	2
benzo[a]pyrene	0.090	0.090	1
bis(2-ethylhexyl)phthalate	0.268	0.408	5
2,4-dimethylphenol	0.193	0.736	10
phenol	3.46	17.1	14
diethyl phthalate	0.215	0.416	2
2,4-dichlorophenol	0.596	1.09	3
di-n-butylphthalate	0.165	0.318	2
2-chloronaphthalene	0.019	0.019	1
2-chlorophenol	0.016	0.017	2
2-nitrophenol	0.004	0.004	1
acenaphthene	0.013	0.040	4
acenaphthylene	0.040	0.073	2
anthracene	0.126	0.126	1
benzo[b]fluoranthene	0.141	0.141	1
butylbenzyl phthalate	0.010	0.010	1
chrysene	0.087	0.087	1
dimethyl phthalate	0.316	0.316	1
fluoranthene	0.091	0.266	3
fluorene	0.070	0.133	2
indeno[1,2,3-c,d]pyrene	0.060	0.060	1
isophorone	2.61	8.45	5
naphthalene	0.135	1.22	13
nitrobenzene	42.5	57.9	4
phenanthrene	0.316	0.620	2
pyrene	0.228	0.228	1
Subtotal	53.1	91.3	

001989

TABLE 4 (con't)
WATER TABLE AQUIFER SAMPLING DATA (con't)
SCP/CARLSTADT, NEW JERSEY

<u>Compound</u>	<u>Average Concentration mg/l</u>	<u>Maximum Concentration mg/l</u>	<u>Number of Occurrences</u>
Metals			
arsenic	0.331	1.60	6
silver	0.110	0.110	1
nickel	0.063	0.15	9
copper	0.028	0.060	9
zinc	0.128	0.690	10
mercury	0.0002	0.0002	1
beryllium	0.001	0.001	3
chromium	0.370	0.420	2
Subtotal	1.03	3.03	
PCBs			
PCB 1242	4.340	17	4
Pesticides			
Beta-BHC	0.005	0.005	1
DDT	0.001	0.001	2
DDE	0.001	0.001	1
Endrin	0.006	0.015	3
Subtotal	0.013	0.022	
TOTAL	1490.0	3890.0	

Note: Concentrations presented in this table were obtained from the Terra, Inc. "Public Health Assessment of the Scientific Chemical Processing (SCP) Site, June 28, 1988" Report.

001900

SECTION 2

PHASE I

DEVELOPMENT OF SOURCE CONTROL ALTERNATIVES

2.0 Introduction

The FS/FOU may be viewed as a progressive screening process occurring in three phases: the development of alternatives, the screening of the alternatives, and the detailed analysis of alternatives.

The basic methodology of the Phase I screening involves subsequent elimination of remedial technologies in an orderly fashion. Phase I of the FS/FOU consists of five steps which are described below. This Interim Status Report, summarizing Task 1 of Phase I deals with the first four of the five steps. The five steps of this preliminary screening are:

- Development of remedial action objectives
- Development of general response actions
- Identification and screening of technology types and process options applicable to each general response action
- Detail screening of technology process options
- Assembling of feasible technology process options into alternatives

For the first step, appropriate remedial action objectives which consist of medium-specific goals for protecting human health and the environment are continually being identified. Remedial action objectives specify the contaminant of concern, exposure routes and receptors, and an acceptable contaminant level or range of levels for each exposure route.

Identification of appropriate general response actions involves development of measures that could provide a remedy or that could be incorporated into a coordinated remedy without identification of specific technologies. General response actions describe those actions that will satisfy the remedial action objectives. They are broadly defined measures which are designed to prevent or minimize the impact of contamination that has migrated into the environment. The determination of potentially applicable response actions is based on data developed during past investigations

Based upon the determination of appropriate general response actions, the next step in Phase I identifies feasible technology types and technology process options that exist within each general response action. Technology types are general categories of technologies, such as biological treatment and capping. Technology process options are specific processes within a technology type (i.e., rotating biological contactors). During this step, technology types and technology process options are screened on the basis of technical implementability. Technology types and technology process options which are clearly precluded by site or waste characteristics of specific media were eliminated during this screening step.

In the fourth step of Phase I, the technology process options considered to be implementable are being evaluated using the criteria of effectiveness, implementability, and cost. Feasible process options that are not eliminated in this screening step will be assembled into proposed remedial alternatives (step 5) in Task 2 of Phase II of the FS/FOU.

2.1 Development of Remedial Action Objectives

To facilitate the development of remedial action objectives, ERM is currently evaluating the suitability of the selected media-specific State and Federal ARARs as well as others to be considered (TBCs), including risk-based criteria, background level criteria, and criteria based upon analytical detection limits.

In order to develop remedial action objectives, information from pertinent site documents (i.e., Terra's 1988 Public Health Assessment Report, Dames and Moore September 19, 1988 Remedial Investigation Report) is being reviewed.

2.2 Development of General Response Actions

The following general response actions are considered appropriate for the SCP site:

Remedial Response Action	<u>Media of Concern</u>		
	<u>Sludges</u>	<u>Surface Soil</u>	<u>Shallow Ground Water</u>
- No Action	x	x	x
- Containment	x	x	x
- Shallow Ground Water Collection			x
? - Diversion	x	x	x
- Removal	x	x	
- Treatment	x	x	x
- Disposal	x	x	x
<i>Institutional Controls</i>	x	x	x

The volumes and area of contaminated surficial soil, sludge and shallow ground water will be calculated based on data presented in Dames and Moore's RI Report (September 19, 1988).

2.3 Identification and Screening of Technology Types and Technology Process Options

After selecting appropriate general response actions, potential remedial technology types and process options for each of the three contaminated media (sludge, surficial soil, shallow ground water) are identified based on previous experience with other sites, published literature on conventional and innovative alternative technologies, and the EPA Handbook of Remedial Action at Waste Disposal Sites (Revised 1985).

As described in the RI/FS Guidance Document (September 1988), the technology types are subdivisions of the general response actions and are the types of technologies which could be applied for a remedial response. Most technology types, however, are further subdivided into specific technology process options. Each process option included in a given technology type would accomplish similar remediation. For example, capping is a technology type under the containment general response action, but there are several types of caps. The various types of caps are process options. This procedure permits a complete and logical screening of remedial alternatives for the SCP site that will be described in detail in the FS/FOU Report. Technology types and process options, summarized in Table 5, were segregated among appropriate general response actions by the type of specific site media.

Using the RI/FS Guidance Document (September 1988) to provide a basic framework, criteria are established to facilitate the prescreening process following the identification of technology types and process options.

The third screening step is site-specific. During this initial screening step, process options and entire technology types are eliminated from further consideration on the basis of technical implementability. Table 6 presents the results of the initial screening (third screening step) of technologies and process options.

2.4 Detailed Screening of Technology Process Options

In the fourth screening step, the technology processes considered to be technically implementable are being evaluated in greater detail. The process options are being evaluated using the same criteria - effectiveness, implementability, and cost. For this screening step, these criteria are applied only to technologies and the general response actions for the First Operable Unit. Furthermore, the evaluation focuses more on the effectiveness

TABLE 5

TECHNOLOGY TYPES AND PROCESS OPTIONS

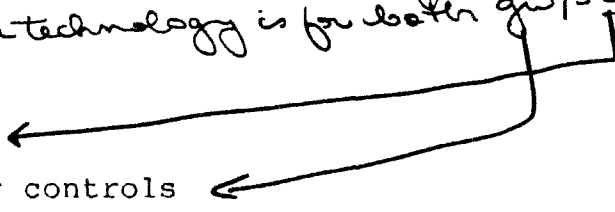
1. NO ACTION
2. CONTAINMENT
- a. Capping
 - 1. Synthetic membrane
 - 2. Single Layer (asphalt, concrete)
 - 3. Multi-media
 - b. Containment Barriers
 - 1. Slurry walls
 - 2. Grout curtains
 - 3. Sheet piles
 - 4. Bottom sealing
3. SHALLOW GROUND WATER COLLECTION
- a. Ground water pumping
 - 1. Extraction wells
 - 2. Injection wells
 - b. Subsurface drains
 - 1. French drains
 - 2. Horizontal drains
4. DIVERSION — *what medium is this for?*
The technology is for both gw/soils
- a. Grading
 - b. Revegetation
 - c. Surface water controls
 - 1. Dikes and berms
 - 2. Channels, ditches, trenches
 - 3. Terraces and benches
- 

TABLE 5 (continued)

5. REMOVAL

- a. Complete removal
- b. Partial removal
- c. Removal and replacement or relocation of sewer lines

6. TREATMENT

a. Shallow ground water treatment

1. Biological (aerobic)

- (a). Suspended growth (activated sludge, sequencing batch reactors, PACT)
- (b). Fixed-film growth (fluidized bed, trickling filters, rotating biological contactors)

2. Physical/Chemical treatment

- (a). Precipitation
- (b). Polymerization
- (c). Neutralization
- (d). Chemical oxidation
 - (i). Hydrogen peroxide with/without UV photolysis
 - (ii). Ozone with/without UV photolysis
- (e). Dehalogenation
- (f). Liquid-liquid solvent extraction (Critical fluid extraction (CO₂))
- (g). Ion exchange
- (h). Flocculation, coagulation, sedimentation
- (i). Granular activated carbon adsorption
- (j). Steam stripping
- (k). Air stripping (with emissions controls)
 - (i). Air stripping with off-gas treatment
- (l). Filtration
- (m). Electrodialysis
- (n). Reverse osmosis

TABLE 5 (continued)

3. Thermal Destruction

- (a). Rotary kiln
- (b). Liquid injection
- (c). Fluidized bed
- (d). Pyrolysis

b. Sludge/soil treatment

1. Biological treatment

- (a). Aerobic treatment
- (b). Anaerobic treatment
- (c). Bioreclamation

2. Physical/Chemical treatment

- (a). Solvent extraction
- (b). Dehalogenation (Alkali metal/polyethylene glycol)
- (c). Dewatering/thickening
- (d). Solidification, stabilization, fixation
 - (i). Cement-based solidification (cement pozzolan)
 - (ii). Silicate-based solidification
- (e). Immobilization (Chelation)
- (f). Soils washing/soil flushing (extraction)
- (g). Low temperature thermal stripping
- (i). Vitrification
- (j). Incineration
 - (i). Rotary kiln
 - (ii). Infrared incineration
 - (iii). Fluidized-bed incineration

7. DISPOSAL — of GW, soil, sludge? yes to all 3.

- a. Off-site disposal
- b. On-site disposal

TABLE 6

INITIAL SCREENING OF TECHNOLOGIES TYPES
AND PROCESS OPTIONS

do each technology being considered for each medium? There is a little distinction

*which medium?
↓ easier to read if each medium is addressed separately.*

General Response Action	Technology Type	Process Option	Description	Screening Comments
No Action	None	Not applicable	No action	Required for consideration by NCP
Containment	Capping	Synthetic membrane	Synthetic membrane covered by soil over areas of contamination	Potentially applicable
		Single layer	Asphalt or concrete slab over areas of contamination	Potentially applicable
		Multi-media	Clay and synthetic membrane covered by soil over areas of contamination	Potentially applicable
		Slurry walls	Trench around site (or areas of contamination), filled with cement bentonite slurry	Potentially applicable
		Grout curtains	Pressure injection of grout in a regular pattern of drilled holes	Potentially applicable
		Sheet piles	Install steel beams next to each other around site (or areas of contamination)	Potentially applicable
		Bottom sealing	Pressure injection of grout at depth through closely drilled holes	Not effective because of non-homogeneous fill material and irregular clay confining layer
Shallow ground water collection	Pumping	Extraction wells	Wells employed to pump ground water for above ground treatment	Potentially applicable

← Barriers

01607

Table 6 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
Diversion	Subsurface drains	Injection wells	Injection wells inject uncontaminated water to increase flow to extraction wells	Not effective because of the variability (hydrogeologic) of fill material
		French drains	Perforated pipe in trenches backfilled with porous media to collect contaminated ground water and treat on site	Potentially applicable
		Horizontal drains	Perforated pipe installed parallel to hydraulic gradient to collect contaminated ground water	Not feasible because of the hydrogeologic conditions of fill material
	Grading	None	Changing existing topography of site to redirect precipitation runoff	Potentially applicable
	Revegetation	None	Mulch and seed site to prevent erosion	Potentially applicable
	Surface water controls	Dike and berms	Compacted earthen ridges or ledges along northern side of site to prevent Peach Island Creek floodwater contact with contaminated media	Potentially applicable
Removal		Channels, ditches and trenches	Excavated ditches to intercept runoff or runoff	Potentially applicable
		Terraces and benches	Topographic modifications designed to divert flow and control erosion by slowing runoff velocity	Not effective because of the flat topography of site
	Complete	None	Excavation of on-site contaminated fill soil sludge, and/or shallow ground water	Potentially applicable
	Partial	None	Excavation of on-site contaminated fill soils, and sludge hot spots, and/or shallow ground water	Potentially applicable

Table 6 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
	Remove and replacement or relocation of sewer lines	None	Remove and replace or relocate cracked sewer lines along perimeter of site to reduce ground water infiltration into sewers	Potentially applicable
<u>Treatment - shallow ground water</u>	Biological	Suspended growth (activated sludge, sequencing batch reactors, PACT)	Aerobic degradation of organics using suspended microorganisms in a completely mixed reactor with or without the addition of powdered carbon	Potentially applicable
		Fixed-film growth (fluidized bed)	Aerobic degradation of organics using microorganisms attached on a fixed medium	Potentially applicable
	Physical/ chemical	Immobilization - precipitation	Chemical equilibrium of ground water is changed to reduce constituent(s) solubility, promoting precipitation of contaminants out of ground water	Potentially applicable
		Immobilization - polymerization	Injection of a catalyst into ground water to convert an organic monomer into a larger chemical multiple of itself with different properties. Transforms a fluid-like substance into a gel-like, nonmobile mass	Not effective because of ground water composition
		Neutralization	Introducing dilute acids and bases into ground water to bring the pH to 7	Potentially applicable
		Chemical oxidation	Mixing ground water with hydrogen peroxide and/or ozone with or without ultraviolet light	Potentially applicable
		Dehalogenation	Using chemical reagents to remove the chlorine atoms (by substitution) from chlorinated compounds in the ground water, resulting in a less harmful chemical compound	Potentially applicable

Table 6 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
		Critical fluid extraction (carbon dioxide)	Extraction of contaminants from ground water using liquified carbon dioxide under high pressure (at its critical point)	Potentially applicable
		Ion exchange	Contaminated ground water is passed through a resin bed where ions are exchanged between resin and ground water	Not effective on <u>organics</u> present in the ground water <i>what if inorganics?</i>
		Flocculation, coagulation, sedimentation	Particulates in contaminated ground water are allowed to agglomerate and settle out of ground water	Not effective on low particulate level in ground water
		Granular activated carbon adsorption	Adsorption of contaminants onto activated carbon by passing water through carbon column	Potentially applicable
		Steam stripping	A continuous fractional distillation process (using steam) to remove contaminants in packed or tray tower	Potentially applicable
		Air stripping (with or without off-gas treatment)	Passing large volumes of air through water in a packed column to promote transfer of VOCs to air. Off-gas treatment by fume incineration or vapor phase carbon	Not effective on many of the organics and inorganics present in the ground water <i>Could this be combined?</i>
		Filtration	Separating solids (particulates) from ground water using porous materials in a filter bed	Low particulate level
		Electrodialysis	Separating ions in ground water by applying an electrical current to the water which causes ions to move through dialysis membrane	Not applicable for organics present in the ground water

(not much screening)

002000

Table 6 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
	Thermal Destruction	Reverse osmosis	Use of high pressure to force water through a membrane leaving contaminants behind	Contaminant concentration too low for treatment
		Rotary kiln incineration	Combustion in a horizontally rotating cylinder designed for uniform heat transfer	Potentially applicable
		Liquid injection	Introduction directly into a flame for combustion	Potentially applicable
		Fluidized bed incineration	Waste injected into a hot agitated bed of sand where combustion occurs	Potentially applicable
		Pyrolysis	Thermal decomposition of contaminants in the absence of oxygen	Potentially applicable
Treatment - Sludge/ Soils	Biological	Aerobic	Degradation of organics using micro-organisms in an aerobic environment	Not applicable to inorganics
		Anaerobic	Degradation of organics using micro-organisms in an anaerobic environment	Not applicable to treat inorganics
		Bioreclamation	Utilized microorganisms to degrade organic constituents in the soil either aerobically or anaerobically	Not applicable to inorganics in soil
	Physical/chemical	Solvent extraction	Contamination is removed by solvent extraction with liquid solvents and/or chelating agents	Potentially applicable
		Dehalogenation	Removal of halogen atoms (by substitution) from organic compounds via chemical reagents	Potentially applicable

Table 6 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
		Dewatering/thickening	Reducing water content of sludge via centrifugation, gravity thickening, or filtration	Not feasible due to soil/sludge characteristics
		Cementitious solidification/stabilization	Mixing with alkaline reagents to produce <u>a rigid matrix</u>	Potentially applicable
		Silicate-based solidification/stabilization	Mixing with pozzolans and alkaline reagents to produce <u>a rigid matrix</u>	Potentially applicable
		Immobilization - chelation	Immobilization of metal ions through the use of organic ligands	Not applicable because of chemical interference from contaminants in soil
	Physical	Soil washing/flushing	Sorbed soil contaminants are mobilized into extractant solution which is recycled	Potentially applicable
		Air stripping	Aeration via physical methods release volatile contaminants	Not effective for inorganic and non-volatile contaminants
		Solidification/stabilization	See "Treatment - sludge, physical" above	Potentially applicable
		Low temperature thermal stripping	Heats soil at low temperatures (i.e., 300°F), volatilizing VOCs into off gas for further treatment by incineration or carbon adsorption	Potentially applicable
		Vitrification	Uses electric current to melt contaminated soils and destroy contaminants, leaving behind a solid block of inert material	Potentially applicable
	Thermal Destruction	Rotary kiln incineration	Combustion in a horizontally rotating cylinder designed for uniform heat transfer	Potentially applicable

processes

Table 6 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
Disposal		Infrared incineration	Uses pyrolysis and subsequent oxidation fueled by infrared energy to destroy contaminants	Potentially applicable
		Fluidized-bed incineration	Waste injected into hot agitated bed of sand where combustion occurs	Not applicable due to expected process problems with solids incineration
	Off-site	None	Extracted contaminated ground water to local POTW for treatment or contaminated soil/sludge to approved landfill	Potentially applicable
	On-site	None	Extracted contaminated ground water to Peach Island Creek or contaminated soil/sludge to on-site landfill/vault	Potentially applicable

criterion, with less emphasis directed at the implementability and cost criteria. The aforementioned criteria are defined as follows:

- Effectiveness: The evaluation of this criterion focuses on how each technology protects human health and/or the environment on a long-term and short-term basis. In addition, the ability of the technology to mitigate contaminants of concern to the established remediation goals as specified in the remedial action objectives as well as the proven performance and availability of the technology are evaluated.
- Implementability: This criterion considers the technical and institutional feasibility of implementing the technology for treating the contaminants and media of concern at the site. Greater emphasis will be placed on the institutional aspects such as the availability of necessary equipment and obtaining the required permits to implement a technology.
- Cost: This criterion is used in a qualitative aspect. Detailed cost estimates are not generated for each technology, rather relative costs (capital and O&M) are used for comparing technologies that achieve the same remediation objective. The cost criterion plays a limited role in screening technologies at this stage.

The comparison of effectiveness, implementability, and cost screening criteria for the various process options is currently being developed.

The process options that are retained from the screening steps of Task 1 will be assembled for potential remedial alternatives (Task 2), completing Phase I of the FS/FOU.

This concludes the Interim Status Report on Task 1 of Phase I for the Feasibility Study/First Operable Unit.

REFERENCES

1. Reger, David W., Civil Action Verified Complaint and Order to Show Cause, Superior Court of New Jersey, Chancery Division, Essex County, May 1983
2. Noce, Philips, Lawyers Title Insurance Corp., Title Search, July 24, 1985.
3. Remedial Action Master Plan (Draft), Scientific Chemical Processing Site, Carlstadt Township, Bergen County, New Jersey. EPA Work Assignment No. 01-2V65.0, Contract No. 68-01-6699, prepared by Resources Applications, Inc. under subcontract to NUS Corporation. RAI Project No. 830431-01, NUS Project No. 0701.30, January 1984.

002005



REFERENCES

1. Reger, David W., Civil Action Verified Complaint and Order to Show Cause, Superior Court of New Jersey, Chancery Division, Essex County, May 1983
2. Noce, Philips, Lawyers Title Insurance Corp., Title Search, July 24, 1985.
3. Remedial Action Master Plan (Draft), Scientific Chemical Processing Site, Carlstadt Township, Bergen County, New Jersey. EPA Work Assignment No. 01-2V65.0, Contract No. 68-01-6699, prepared by Resources Applications, Inc. under subcontract to NUS Corporation. RAI Project No. 830431-01, NUS Project No. 0701.30, January 1984.

002000